Banking industry stability and investment dynamics

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Abstract

Purpose – This paper aims to evaluate how strands of differing investments influence stability in the banking industry using data from 37 countries in Sub-Sahara Africa from 2000 to 2018.

Design/methodology/approach – Empirical analyses in the study were carried out using a two-step system Generalized Method of Moments estimation methodology.

Findings – Empirical results suggest that generally, growth in investments by governments, foreign investments and private domestic investments have a significant positive impact in stabilizing the banking industry. The empirical estimates further suggest that macroeconomic conditions such as macroeconomic uncertainty adversely affects the liquid reserve position of banks even during periods of appreciable growth in investments.

Originality/value – The authors present a different approach to the banking industry discourse. Instead of surmise the relationship with the direction of impact often emanating from the banking industry to other variables of interest or conditions, this study rather examines how investment dynamics among economies influence the stability of the banking industry overtime. In contrast to related studies, this study examines how strands of investment variables influence the stability of the banking industry. Specifically, this study is modeled to examine the extent to which variability in investment growth (using different investment variables) affect stability in the banking industry.

Keywords Governance quality, Banking industry stability, Investment dynamics, Two step system GMM

Paper type Research paper

1. Introduction

The banking industry performs one of the fundamental growth augmenting functions in an economy. As the primary financial entity providing financial resources in support of economic activities in various sectors of an economy, the robustness and efficiency of the banking industry often define the performance trajectory of other sectors of an economy. The efficient banking industry, for instance, helps foster economic growth by promoting investor confidence and investments through offerings of the portfolio of financial resources in support of investment projects. In both regional and the global economy as a whole, the banking industry, directly and indirectly, supports a myriad of activities necessary for sustained growth and development. The impact of the banking industry on economic growth (gross domestic product (GDP) growth [GDPG]) emanates from its fundamental

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interactions with economic agents; consumers, investors and the government. For instance, the banking industry mobilizes savings from consumers, industry, etc., to create a portfolio of various financial products to support investments by both investors and governments. By providing the means to attract and mobilize savings, and further channel such idle and speculative financial resources to the various sectors of an economy, the banking industry in this regard, acts as the main arteries fueling the engine responsible for productivity, sectoral growth and ultimately general economic growth.

The integral role of the banking industry as one of the core engines of economic growth; and conditions or factors impacting its operations have been reviewed severally in the related literature (Levine and Zervos, 1998; Beck and Levine, 2004; Ogege and Boloupremo, 2014; Rioja and Valev, 2014; Nyasha and Odhiambo, 2015; Fufa and Kim, 2018; El Menyari, 2019). Apart from specific studies focusing on the banking industry and economic growth nexus, the literature further offers a significant number of empirical reviews examining the relationship between the operational activities of the banking industry and investments or investment growth (refer to Aggarwal and Yousef, 2000; Omankhanlen, 2012; Wruuck *et al.*, 2015; Zhang *et al.*, 2018; Mertens and Thiemann, 2019; Nwanji *et al.*, 2020). Additionally, related literature further highlight a legion of empirical inquiries designed to review the fundamental association between banking sector/industry performance and performance of other firms in an economy (Fok *et al.*, 2004; Giannetti and Ongena, 2009; Chuang, 2017; Zemzem *et al.*, 2017; Léon, 2020).

Apart from these studies, the literature further highlight a number of studies examining how specific macroeconomic conditions influence operational activities or performance of the banking industry or banks (refer to Anbar and Alper, 2011; Saeed, 2014; Yakubu, 2016; De Leon, 2020; Chen and Lu, 2021). The above synopsis of the literature on the banking industry, to a large extent, affirm the pivotal role of the banking industry to individual economies, and the global economy as a whole. It further highlights variety in the range of studies focusing on how operational activities of the banking industry affect investment growth, economic performance, the performance of other firms, etc. This succinct overview of the literature further suggests that the role of the banking industry in an economy; and the impact of its operational activities on various sectors continue to evolve with changing macroeconomic conditions and investor behavior.

In this study, however, we present a different approach to the banking industry discourse. Instead of surmised relationship with the direction of impact often emanating from the banking industry to other variables of interest or conditions, this study rather examines how investment dynamics among economies influence the stability of the banking industry overtime. This approach in our view offers an opportunity to augment existing literature on the dynamic operational characteristics of the banking industry. This reverse approach, which focuses on how the stability of the banking industry may be explained by investment dynamics, hinges on the presumption that the fundamental relationship between banks or the banking industry, the economy, investment, etc., is a symbiotic one instead of a skewed relationship where the impact of the banking industry is often the focal point. That is, although much of the attention among reviewed studies have mostly been on the role or the influence the banking industry or banks have on the economy as a whole; other firms or sectors of the economy, etc., we are of the view that the relationship is more synergistic or reciprocal in nature. Consequently, we hypothesize that activities or conditions associated with various economic sectors such as investments growth have the potential to influence the stability or otherwise of the banking industry. Accordingly, in contrast to related studies, this study examines how strands of investment variables influence the stability of the banking industry. Specifically, this study is modeled to examine the extent to which

variability in investment growth (using different investment variables) affect stability in the banking industry. This focus has been informed by the fundamental assumption that investment growth volatility has the potential to influence stability in the banking industry through loan demand uncertainty, loan performance, loan default rate, etc. For the purpose of this study, banking industry stability defines a state of the relatively minimal level of volatility and susceptibility to shocks; through the strengthening of liquid reserves, capital sufficiency and reduced level of overall bank risk. Following the works of Laeven and Levine (2009), Bai and Elyasiani (2013), Fang *et al.* (2014), Goetz (2018), Ahamed and Mallick (2019) among others, we proxy banking industry stability by the bank Z-score, bank liquid reserve to asset ratio (BLR) and bank capital to asset ratio (CAR), respectively.

Apart from the fundamental relationship, we seek to examine above, this study further examines how this relationship in question, may be moderated by two critical conditions or variables after controlling for it in prior estimates. In this regard, we further examine how macroeconomic uncertainty (MU) and the quality of governance (governance quality index [GQI] is constructed from variables, such as government effectiveness and corruption control) influence the interaction between investment dynamics and stability in the banking industry. Thus, compared to related studies, this study differs in three main aspects. First, we investigate stability in the banking industry as a function of investment dynamics instead of reverse inquiry often found in the literature (Ndikumana, 2005; Obafemi *et al.*, 2016). Second, we verify how MU may moderate such a relationship; and finally, we ascertain the role of governance in the surmised relationship between the stability of the banking industry and investment growth.

2. Literature review

Theoretically, the relationship in question can be associated with models that explain the influencers of bank performance or profitability that engender the robustness of the industry. To this end, the Kaldorian model of the business cycle (Skott, 1989) and its impact on the profitability or performance of the banking industry has been identified by studies, such as Ryoo (2013), Demirgüç-Kunt and Huizinga (2000) and Bikker and Hu (2002). The model explains how cyclical movement in economic activities, illustrated by movement in various economic variables or activities in an economic setting could influence the performance or profitability (hence sturdiness) of the banking industry. According to Scott (1989), cyclical movements of utilization, employment and accumulation is created by the interaction between short-run fluctuations in demand levels with the condition labor market. The model emphasizes the importance of adjustment of output in response to firms' profitability and the labor market condition. There is the incentive for output expansion as a result of higher profitability while a tightened labor market serves as a disincentive for firms' expansion agenda (Ryoo, 2013). This argument implies that output growth in an expanding labor market serve as an incentive for growth in profitability, hence, stability. As a function of output growth, the importance of investment dynamics in an economy in this regard can also be inferred from the model in a broader sense. Following the tenets of this concept, therefore, we argue that the rate of investment in an economy from domestic investors, foreign investors and the government may influence the performance of the banking industry in terms of ensuring stability in key facets. The effect of investment on the performance of banks can also be analyzed from the perspective of loan performance (credit facilities to the private sector for investment). For instance, the mechanics of loan performance, explained by the concept of information asymmetries in the form of adverse selection and moral hazard (Laryea *et al.*, 2016) could influence the profitability and ultimately, the stability of the banking industry. Ongore and Kusa (2013) also make

reference to the literature to identify the market power and efficiency structure theories as explaining the performance of the banking industry. Ongore and Kusa (2013) argue that the market power theory emphasizes the effect of external factors in the bank profitability discourse via the respective size (monopolistic power) of players in the industry while the efficiency structure theory avers that improved managerial and scale efficiency result in higher profitability due to increased concentration. The literature, thus identify fundamental theories as well as external factors influencing bank performance or profitability to include interest rate, inflation, economic growth among others (Athanasoglou *et al.*, 2008). This study argues that via their contribution to economic growth (refer to Adams, 2009; Emmanuel and Kehinde, 2018), investment variables (from foreign, domestic and government sources) have the potential to influence the performance of the banking industry; hence, its stability.

Empirical works on bank performance, hence, stability and its determinants have mainly focused on bank-specific, banking industry specific and external or macroeconomic factors. According to Segoviano Basurto and Goodhart (2009), in a market economy, characterized by the presence of workings of the invisible hand of market forces, market or business cycles and other economic factors affect the performance or stability of the banking industry; the magnitude of such influence, however, depends on the economy in question. Market cycles in this regard could be captured in terms of fluctuations in the level of investment from foreign, domestic and government sources. In a related study to the approach adopted in this paper, Jokipii and Monnin (2013) concluded using data from organization for economic co-operation and development and vector autoregressive estimation technique that a significant direct relationship exists between output growth and bank stability. As an influential component of output growth among economies (Adams, 2009; Abu and Karim, 2016), various investment factors could, therefore, affect the performance and stability of the banking industry following the conclusion by Jokipii and Monnin (2013). Using data from 96 countries from 1998 to 2005, Babihuga (2007) identified such factors including economic growth, inflation, exchange rate and unemployment as affecting key performance variables, such as capital adequacy, loan quality, bank profitability and asset quality. Kinda *et al.* (2018) also recommended the strengthening of regulatory measures in efforts at improving the robustness of the banking industry. This recommendation by Kinda *et al.* (2018) brings into focus the possible role of governance structures in the discourse. Other notable studies that highlight the influential role of governance structures in the debate regarding banking sector stability include Ozili (2018), Klomp and De Haan (2014) and Beltratti and Stulz (2012).

With respect to the relationship between investment and bank performance or stability, our review failed to find specific study or studies with focus and objective similar to what this study seeks to verify; a few closely-related studies could, however, be cited. Fan and Dickie (2000) concluded that foreign direct investment (FDI) inflow stabilized the ASEAN-5 economies during the Asian financial crises. Obafemi *et al.* (2016) examined the effect of financial deepening on domestic investment using financial deepening variables, such as banking spread and real interest rate from 1970 to 2013 and concluded that these factors exert a significant impact on investment. Using data from the Ghanaian economy, Musah *et al.* (2018) examined the effect of FDI on the profitability of commercial banks and economic growth. Musah *et al.* (2018) concluded that the inflow of FDI has a positive effect on the profitability of commercial banks measured using Return on Assets (ROA). In a related study for the Kenyan economy, Kariuki and Sang (2018) found significant positive effect exerted by inflow of foreign investment on the performance of banks using ROA and Return on Equity as measures of performance. Nwanji *et al.* (2020) assessed the impact of

FDI on financial performance of deposit banks in the Nigerian economy from 2010 to 2017 using Tobin's Q as a measure of financial performance. They concluded from the results that inflow of FDI has contributed positively to the performance of deposit banks over the study period. Omankhanlen (2012) also examined the role of banks in capital formation for the Nigerian economy, concluding that commercial banks credit positively affect domestic investment measured using the gross fixed capital formation. Zhang *et al.* (2018) focused on evaluating the impact of the trend of investment in the real estate industry on the stability of the financial sector in the Chinese economy. The results of the study revealed a close connection between investment growth in the real estate industry and non-performing loans (NPL) (the financial sector was found to be significantly sensitive to the real estate market cycles).

The above reviewed literature highlight the critical role investments play in both domestic and global economic growth. Existing literature further showcase how investment dynamics influence bank performance, measured mainly by profitability variables. This present study, however, focus specifically on the stability of the banking industry from three main perspectives – bank liquid reserve, bank capital sufficiency and overall bank risk; and evaluate how strands of investment variables influence stability in the industry.

3. Sources and description of data

The study makes use of data compiled from 37 countries in Sub-Saharan Africa (SSA) from various sources for the period beginning 2000 to 2018. The countries selected and the period of the study were based on the availability of data for the key variables of focus. These sources are the World Bank's World Governance Indicators (WGI), World Development Indicators (WDI), Global Financial Development Database (GFDD) and the Fraser Institute Database. From the WDI, we collected data on annual frequency for variables, such as the BLR, net FDI inflow, gross capital formation (GCF) (formerly referred to as gross domestic investment), gross domestic savings (GDS), exchange rate, trade, GDPG and broad money. The governance and regulatory variables comprising of control of corruption, government effectiveness, political stability, regulatory quality, rule of law and voice and accountability were also compiled on annual basis from the WGI. Again, from the GFDD, variables, such as CAR, bank Z-score, bank credit to bank deposit ratio, domestic credit to the private sector (DCP) and private credit by banks and other financial institutions (PC) were also collected on an annual basis for the study period. Finally, government consumption (GC) and investment indexes, constructed by the Fraser Institute were compiled to complete the set of variables required per the study's objectives.

According to the World Bank, BLR measures the ratio of domestic currency holdings and deposits with the monetary authorities in relation to claims on governments, the private sector, other financial and nonfinancial institutions. FDI represents the net inflow of investment for the acquisition of lasting management interest in a business operating in the sub-region, expressed as a percentage of GDP. GCF, a measure of domestic investment consists of expenditure on fixed assets (land improvement, plant, machinery, etc.) of an economy as well as the net changes in inventories. GDS as defined by the World Bank is the value of GDP less total expenditure on consumption. The exchange rate measures the respective country's local currency units relative to the US Dollar while broad money, the measure of money supply (MS) is the annual growth of currency outside the bank. Trade, representing trade liberalization is the total value of imports and exports as a percentage of GDP. The CAR represents the ratio of bank capital and reserves (owners funds, retained earnings, general reserves, special reserves, provisions and adjustments) in relation to the total assets of banks. The bank Z-score measures the overall probability of

default of the banking system, by comparing the buffer of the banking system against the volatility of returns in the industry. A higher Z-score indicates the robustness of the banking system and vice versa. Bank credit to bank deposit ratio also measures private credit by deposit money banks in relation to the total deposits while PC represents the total credit to the private sector by all financial institutions as a percentage of GDP. The governance indicators as described by the World Bank are indexes that rank countries according to their performance in six key areas as already listed, where a higher score indicates good performance and vice versa.

4. Macroeconomic uncertainty and governance quality index

In addition to serving as controls, the study intends to evaluate the impact of uncertainty in the macroeconomic environment and governance quality in the relationship between investment factors and stability in the banking industry. We derived the MU variable using an econometric procedure while GQI was constructed using the Principal Component Analysis (PCA) approach. The generalized autoregressive conditional heteroskedasticity (GARCH) econometric methodology by Bollerslev (1986) was used to generate volatility data for GDPG to represent MU. According to GARCH modeling technique, the conditional variance of a variable is dependent on its own lags; the variance of the unpredictable or stochastic term, therefore, represents the volatility data. MU, a measure of risk in the macroeconomic environment is derived using this procedure as against alternative approaches such as standard deviation. MU derived via the GARCH approach generates unpredictability or volatility surmised to present degree of risk to key actors in an economy. This state of unpredictability could have an impact on various sectors of an economy including the banking industry. GARCH (1,1) is used to generate the volatility data for each of the 37 countries sampled for the study. Equations (1) and (2) as presented below are the mean and GARCH (1,1) equations used in deriving the volatility data for each country:

$$GDPG_t = \alpha + \vartheta GDPG_{t-1} + \varepsilon_t \tag{1}$$

where $\varepsilon_t \approx N(0, h_t^2)$

$$\sigma_t^2 = \varnothing + \varphi \mu_{t-1}^2 + \delta \sigma_{t-1}^2 \tag{2}$$

From equations (1) and (2), $GDPG_t$ is GDPG at time t and σ_t^2 represents the volatility associated with GDPG for each of the 37 countries. The intercepts for the mean and GARCH equations are denoted by α and $\varnothing$, respectively, while φ and δ denote the coefficients of the ARCH term and the GARCH term, respectively. This procedure has been used extensively in the literature as a result of its success; among such notable research works that have applied the approach include Gökbulut and Pekkaya (2014), Asamoah *et al.* (2016), Abaidoo and Anyigba (2020) and Asteriou and Price (2005).

The GQI is constructed as a composite index using data from the six variables (control of corruption, government effectiveness, political stability, regulatory quality, rule of law and voice and accountability) collectively captioned as governance indicators by the World Bank. Taking a cue from other notable studies, such as Ellul and Yerramilli (2013), Bali *et al.* (2014) and Ahamed and Mallick (2019), the PCA procedure is adopted to generate weights for each of the variables for all the countries. This approach is used because it presents superior results as compared to other methods, such as merely assigning equal weights or using expert opinions to assign weights (Sendhil *et al.*, 2018). Ahamed and Mallick (2019) describe the PCA as a multivariate statistical process that generates smaller versions called

principal components from a large set of numbers by retaining a greater component of the variance and neglecting the redundancies. The principal components are derived from the eigenvectors of the correlation matrix proportional to the weights of each of the components (Ahamed and Mallick, 2019). Upon generation of the principal components, the components that explain the greater proportion of variations are presented as the weights in constructing the index. The WGI database presents all six variables as indexes of equal scale, we, therefore, do not need to normalize the data sets; and hence, proceed with the construction of the index using equation (3) below:

$$GQI_{it} = \sum_{j}^{n} \left\{ \left(GV_{j,it} * \omega_{j,i} \right) / \sum_{j}^{n} \omega_{j,i} \right\} \tag{3}$$

Per equation (3), GQI_{it} denotes GQI for country i at year t, $GV_{j,\ it}$ represents the data point for governance variable j of country i at year t and $\omega_{j,\ i}$ is the weight for governance variable j for country i generated via PCA. Following the principle of the individual variables that make up this constructed composite index, a higher index indicates the enhanced quality of governance while a lower index portrays a deteriorating state of governance.

5. Model specification and estimation technique

This study, first of all, examines the impact of various investment variables on the stability of the banking system in SSA in reference to the liquidity reserve, capital and overall risk position. To achieve this objective, we present equation (4) below:

$$BS_{p,it} = \omega + \alpha BS_{p,it-1} + \sum_{n\ =\ 1}^{8} \lambda_n INV_{q,\ it} + \varphi GDPG_{it} + \varnothing TL_{it} + \gamma lnEXR_{it} + \text{б} MS_{it} + \psi GQI_{it} + \vartheta MU_{it} + \mu_{it} \tag{4}$$

From equation (4), the subscript i represents the various countries while the subscript t denotes the years under study (i = 2000, 2001, [. . . . . .], 2018). BS_p denotes bank stability variable p, INV_q refers to investment variable q, *GDPG, TL, lnEXR* and *MS* are GDPG, trade liberalization, natural log of exchange rate and MS, respectively. *GQI* denotes GQI, *MU* represents MU and μ_{it} is a vector of error terms made up of time-specific effect, country-specific effect and residual term. ω represents the intercept while α, λ, φ, $\varnothing$, γ, б, ψ and ϑ are the coefficients of the explanatory variables following the order of appearance. The influence of MU on the effect of various investment factors on banking sector stability in the sub-region is also assessed in reference to equation (5) spelt out below:

$$BS_{p,it} = \omega + \alpha BS_{p,it-1} + \sum_{n\ =\ 1}^{8} \lambda_n INV_{q,\ it} + \varphi GDPG_{it} + \varnothing TL_{it} + \gamma lnEXR_{it} + \text{б} MS_{it} + \psi GQI_{it} + \beta_q \left(MU_{it} * INV_{q,it} \right) + \mu_{it} \tag{5}$$

According to the equation, β_q represents the coefficient of interaction variable between MU and investment variable q while the remaining variables and symbols follow the definitions per equation (4). The study again proceeds to verify the influence of governance quality in

the relationship between the various investment factors and stability of the banking industry in the sub-region by specifying equation (6) below.

$$BS_{b,it} = \omega + \alpha BS_{b,it-1} + \sum_{n=1}^{8} \lambda_n INV_{q,\ it} + \varphi GDPG_{it} + \varnothing TL_{it} + \gamma lnEXR_{it} + \delta MS_{it} + \vartheta MU_{it} + \upsilon_q \left(GQI_{it} * INV_{q,it}\right) + \mu_{it} \quad (6)$$

From equation (6), υ_q is the coefficient of the interaction variable between governance quality and investment variable q, with the rest of the symbols and variables following the definitions per equation (4).

We estimate the various models using the two-step system Generalized Method of Moments (GMM) by Arellano and Bond (1991) and Arellano and Bover (1995). This estimation technique is preferred against other alternative panel approaches because as argued out by Hall (2005), it presents results with consistent and asymptomatically normally distributed estimators. Again, the GMM is recommended by Wooldridge (2001) in place of alternative estimators, such as the Ordinary Least Squares and the Two-Stage Least Squares that are associated with the possibility of failed auxiliary assumptions such as homoscedasticity. Wooldridge (2001) further argues that, as the GMM permits the inclusion of lagged dependent variables with no loss of efficiency and controls for unobserved effects, it can be identified as an efficient estimator. The GMM also controls for variable persistence, a feature that is mostly associated with panel data (Sarpong-Kumankoma *et al.*, 2018). Hwang and Sun (2018) also identifies the two-step estimator as an asymptotically robust technique as compared to the one-step variant, as the two-step estimator produces smaller asymptotic variance. Using the Arellano and Bond AR(2) test of serial correlation with the error term and the Hansen test of over-identification restriction the robustness of the estimator is assessed to ensure efficient results for inferences. Based on the aforementioned features of the GMM, we find it as an efficient and robust technique for this study.

6. Data descriptive and analysis

We proceed with a presentation and analysis of the data and the empirical estimates in this section. First of all, in Table 1, the descriptive statistics is presented. According to the table, over the study period for the sampled countries, the sub-region recorded an average of 19.44% of the total value of assets as liquid reserve. CAR averaged 11.51% while the average Z-score index was 11.50. The standard deviations for all the bank stability variables are below their respective mean values, indicating that there exist a lower extent of disparity in the level of stability in the banking industry among economies in the sub-region. Similarly, for the investment variables, overall, the mean values and their respective standard deviations indicate that the degree of variation in the level of investment among the various countries does not show the significant disparity. Again, for the period under study, the growth in GDP averaged 4.49% while the mean GQI (−0.59) indicates a sub-region with relatively poor governance structures.

In Table 2, the results of the multicollinearity diagnostic test is presented with the objective of verifying the acceptability of the various explanatory variables for the estimations. This is done to avoid the problem of having to analyze spurious results due to multicollinearity problems. The results as displayed in the table indicate that none of the variables has Variance Inflation Factor (VIF) in excess of 10, per the recommendation by

Variable	Obs.	Mean	Median	SD	Max.	Min.
Bank liquid reserve	587	0.1944	0.1707	0.1437	1.0950	0.0164
CAR	280	0.1151	0.1096	0.0359	0.2368	0.0149
Bank Z-score	629	11.5040	9.9048	6.3408	47.3412	1.0708
FDI	701	0.2880	0.2431	0.2763	1.0334	−0.7728
Gov't consumption index	610	6.7315	7.1534	2.0013	12.9570	1.0706
Gov't investment index	607	5.9250	6.0571	3.0335	10.0000	0.0033
Bank credit to bank deposit	641	0.7481	0.7375	0.2548	1.6462	0.1803
DCP	647	0.2333	0.1369	0.3376	2.5718	0.0040
Private credit-all fin. institutions	641	0.2839	0.1305	0.7428	9.7221	0.0087
GCF	667	0.2261	0.2129	0.0972	0.7789	0.0110
GDS	667	0.1231	0.1247	0.2089	0.6493	−1.4197
Natural log – exchange rate	697	4.9348	6.1534	2.1839	9.1147	−0.6071
Trade liberalization	684	0.6980	0.6087	0.3446	3.1135	0.1793
GDPG	702	0.0449	0.0461	0.0448	0.3363	−0.3639
MS	703	0.1666	0.1141	0.1547	0.7239	0.0074
GQI	666	−0.5871	−0.6436	0.6454	1.3096	−3.7506
Microeconomic uncertainty	703	0.2654	0.0008	3.2743	67.0609	0.0000

Table 1.
Descriptive statistics

Variable	VIF	SQRT-VIF	Tolerance	R^2
FDI	1.11	1.05	0.8989	0.1011
Gov't consumption index	1.61	1.27	0.6217	0.3783
Gov't investment index	1.26	1.12	0.7917	0.2083
Bank credit to bank deposit	1.52	1.23	0.6588	0.3412
DCP	2.64	1.62	0.3789	0.6211
Private credit-all fin. institutions	8.32	2.89	0.1201	0.8799
GCF	1.59	1.26	0.6276	0.3724
GDS	1.28	1.13	0.7790	0.2210
Natural log – exchange rate	1.59	1.26	0.6290	0.3710
Trade liberalization	1.76	1.33	0.5690	0.4310
GDPG	1.10	1.05	0.9128	0.0872
MS	1.02	1.01	0.9789	0.0211
GQI	1.72	1.31	0.5802	0.4198
Microeconomic uncertainty	6.46	2.54	0.1547	0.8453

Table 2.
Multicollinearity test

Liao and Valliant (2012). This means that all the variables meet the criteria for acceptability for model estimations, based on which valid inferences could be made.

The conclusion in respect of multicollinearity is confirmed by making reference to the results of the pairwise correlation matrix presented as Table 3. We reach this assertion by making reference to the recommendation by Elith *et al.* (2006), who aver that for variable acceptability, the correlation coefficient between pair of the variables should be less than 0.85. The results show that the correlation coefficient for the various pairs of the variables are less than 0.85, making all the variables acceptable for the study's estimations.

7. Empirical results and analysis

7.1 Impact of investment on banking industry stability

The results of empirical estimation aimed at evaluating the impact of the strand of investment factors on stability of the banking industry from the three perspectives (liquidity

Table 3.
Correlation matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
Bank liquid reserve (1)	1																
CAR (2)	0.13	1															
Bank Z-score (3)	−0.20	−0.01	1														
FDI (4)	0.23	−0.05	−0.03	1													
Gov't consumption index (5)	0.24	0.28	−0.26	−0.03	1												
Gov't investment index (6)	0.22	0.02	0.05	0.14	0.15	1											
Bank credit to bank deposit (7)	−0.40	−0.13	0.47	−0.13	−0.19	−0.02	1										
DCP (8)	−0.53	−0.40	0.28	0.01	−0.34	−0.07	0.61	1									
Private credit-all fin. institutions (9)	−0.53	−0.40	0.28	0.00	−0.33	−0.07	0.61	0.21	1								
GCF (10)	0.27	−0.12	−0.03	0.13	−0.28	0.03	−0.09	−0.10	−0.12	1							
GDS (11)	0.50	−0.12	0.22	0.06	−0.05	0.37	0.19	0.03	0.03	0.30	1						
Natural log – exchange rate (12)	0.26	0.33	−0.12	−0.16	0.37	−0.02	−0.29	−0.45	−0.44	−0.16	0.08	1					
Trade liberalization (13)	−0.17	−0.28	−0.03	0.04	−0.56	−0.09	−0.13	0.15	0.14	0.42	−0.14	−0.55	1				
GDPG (14)	0.06	−0.05	−0.06	0.05	0.15	−0.16	−0.19	−0.14	−0.15	0.13	0.00	0.02	−0.04	1			
MS (15)	−0.01	−0.02	0.01	−0.02	0.02	−0.02	−0.06	−0.04	−0.03	−0.04	0.00	−0.01	0.01	0.13	1		
GQI (16)	−0.32	−0.32	0.17	0.10	−0.23	0.08	0.34	0.61	0.61	0.06	0.08	−0.55	0.35	−0.04	−0.04	1	
Microeconomic uncertainty (17)	0.09	0.35	−0.29	−0.14	0.27	−0.07	−0.19	−0.24	−0.23	−0.22	−0.14	0.24	−0.16	−0.30	0.07	−0.23	1

reserves, capital adequacy and overall bank risk) are presented in Table 4. Respectively, Columns (1), (2) and (3) assess the impact of various investment variables on bank liquid reserve, CAR and bank Z-score. Among the three columns of Table 4, the first lag of the respective dependent variables have positive significant coefficients, implying that the current year's level of stability in the industry has a direct effect on the subsequent year. This trend could be of immense importance to regulators and policymakers in the banking industry in terms of policy direction. The trend of stability in the banking industry for the current year could be used to forecast and shape policies aimed at making the industry more robust for the growth and development of economies in the sub-region in the near future. Results in Column (1) show that GC, private credit by financial institutions, GCF (domestic investment) and GDS have significant positive impact on bank liquid reserves. For a sub-region comprising of emerging economies, as investment in the form of capital asset acquisitions, provision of credit facilities by financial institutions to businesses for the acquisition of capital items, government expenditure and general rate of savings increase, economic activities experience a boost, leading to economic buoyancy. As one of the main institutions responsible for financial service intermediation, buoyancy in economic activities means strengthening of the banking system, hence, increased level of bank liquid reserves.

Variables	(1) BLR	(2) CAR	(3) Z-Score
1st Lag	0.808*** (20.91)	0.980*** (18.14)	0.912*** (35.44)
FDI	0.0113 (0.70)	0.0133 (1.65)	1.485*** (2.90)
GC	0.00296** (2.53)	0.000619 (0.83)	0.0250 (0.22)
GI	−0.000539 (−0.50)	−0.000346 (−1.05)	−0.0501 (−0.77)
BCD	−0.0510*** (−6.17)	0.0253** (2.22)	−0.188 (−0.26)
DCP	−0.195** (−2.47)	−0.0263* (−1.78)	2.283** (2.51)
PC	0.213** (2.59)	0.00993 (0.72)	−2.024 (−1.12)
GCF	0.186*** (2.86)	0.00726 (0.72)	−4.374** (−2.49)
GDS	0.0556** (2.43)	0.00447 (0.43)	2.457** (2.55)
LnFX	−0.00360** (−2.25)	0.00174*** (3.18)	0.188*** (2.91)
Trade	−0.0258*** (−3.03)	0.0165* (1.95)	1.835** (2.12)
GDPG	−0.120 (−1.31)	−0.0798 (−1.35)	1.834 (0.47)
MS	0.0459 (0.57)	0.0772 (1.51)	0.459 (0.37)
GQI	−0.0255*** (−5.09)	0.000559 (0.21)	0.792 (1.38)
MU	−0.242** (−2.64)	−0.293 (−0.48)	1.986 (1.00)
Constant	0.0272 (1.16)	−0.0450 (−1.64)	−0.669 (−0.48)
Obs.	400	198	420
Countries	34	24	36
F-stat	16653.3	146.0	13220.9
P-value	1.59e-59	3.65e-19	4.58e-61
Instruments	54	41	56
AR(1)	0.00815	0.0153	0.0302
AR(2)	0.531	0.405	0.438
Hansen P	0.974	0.999	0.996

Notes: *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$. *t*-statistics in parentheses. BLR = Bank Liquid Reserve to Asset Ratio, CAR = Bank Capital to Asset Ratio, Z-Score = Bank Z Score, NPL = Non-Performing Loans, FDI = Foreign Direct Investment, GC = Government Consumption, GI = Government Investment, BCD = Bank Credit to Deposit Ratio, DCP = Domestic Credit to Private Sector, PC = Private Credit by Banks and Other Financial Institutions, GCF = Gross Capital Formation, GDS = Gross Domestic Savings, LnFX = Natural Log of Exchange Rate, Trade = Trade Openness, GDPG = GDP Growth, MS = Money Supply, GQI = Governance Quality Index, MU = Macroeconomic Uncertainty

Table 4. Impact of investment factors on bank stability

On the other hand, the results also indicate that bank credit to deposit ratio (BCD) and DCP have significant negative impact on bank liquid reserves. This finding indicates that generally as banks provide more credit facilities; their liquid reserve position is adversely affected in the process. Even though the results indicate that net inflow of FDI has an insignificant impact on bank liquid reserves, the positive direction of impact confirms the earlier assertion that as investment in the form of capital item acquisitions increase, banks benefit in the form of the increased level of liquid reserves. Again, in Column (1), the results depict that government investment (GI) has insignificant negative influence on bank liquid reserves. For the control variables, the results indicate that exchange rate, trade liberalization, governance quality and MU exert significant negative impact on bank liquid reserves. This implies that depreciation of the local currencies against the US Dollar and MU pose liquidity risk to banks in the sub-region. Similarly, the result suggest that opening up the economies to international trade and improved governance may not benefit the banking industry in terms of improving liquid reserves.

In Column (2), where we assess the impact of various investment variables on bank stability using CAR as proxy, it is evident from the results that BCD has a significant positive effect. This signifies that as the level of credit provided by banks in relation to deposits increase in the sub-region, the amount of capital held by banks increases all things being equal, strengthening the banking industry. Increased credit in the form of loans with reference to the total deposits of the banking industry could lead to increase in interest income, which could consequently result in increased profitability of the industry. Shareholders' fund for the industry could, therefore, witness an appreciation, hence, stability in the industry in terms of capital sufficiency, as in most cases, total earnings are not wholly distributed as dividends to owners; significant portions are retained for the growth of the banks. The results in Column (2) further show that domestic credit to the private sector has significant adverse effect on CAR at the 10% alpha level. This means that as credit to the private sector increases, the capital base of banks in the sub-region decline relative to the total assets. It means that increased build-up of loan assets (advances) on the balance sheet of banks without recourse to the quantum of shareholders' fund and deposits of the banking industry presents a precarious situation to the industry, as the capital invested might not be able to support the increased value of such loans and advances. The results further illustrate the importance of the assessment of credit facilities offered by banks in relation to the total value of deposits and capital to ensure that the industry has the needed financial base to support such credit facilities. The other investment variables do not indicate significant influence even though a number of them (FDI, GC, private credit by all financial institutions, GCF and GDS) display a positive direction of influence while GI indicate a negative direction of influence on capital adequacy in the banking industry. With respect to the control variables, Column (2) results show that exchange rate and trade liberalization have positive effect on CAR. It means that increased level of international trading, accompanied by a rise in the rate of exchange between the US Dollar and the respective local currencies boosts the banking industry in the form of increased amount of capital.

Results as shown in Column (3) of Table 4 where banking sector stability is proxied by Z-score indicate that FDI, DCP and GDS have significant positive influence. This means that as inflow of foreign funds into the sub-region increase, credit to the private sector appreciates and savings rate improves, the banking sector is strengthened in terms of alleviating the overall risk faced in the industry. FDI makes funds available in the sub-region, and as the main conduit of financial activities of economies, the banking industry benefits immensely when the levels of such funds increase all things being equal. Again, appreciation in the amount of credit to the private sector results in increased level of interest

margins for the banking industry all things being equal. Profitability of the industry could, therefore, appreciate, leading to a robust banking industry, hence, the observed result. The results per Column (3) again indicate that GCF strikingly has a negative effect on stability of the industry represented by the Z-score. This implies that domestic investment does not strengthen the banking industry in the form of reduction of overall risk. Similar to the results observed in Column (2), for the control variables, the results show that trade liberalization and exchange rate have significant positive effect on bank Z-score as a proxy for banking sector stability, implying that opening up economies in the sub-region to international trading with its associated exchange rate movements benefit banking industry in terms of reducing overall risk.

In summary, we can infer from the results as discussed that the direction and magnitude of impact of strand of investment variables on stability of the banking industry is dependent on the form of variable of banking industry stability measure being assessed. For example, while GCF (domestic investment) improves bank liquid reserves, it is found to exert an adverse effect on the overall risk (bank Z-score) of the industry. Similarly, while DCP deteriorates the liquid reserve and capital positions, it stabilizes the industry by reducing the overall risk. Again, BCD worsens the liquid reserve position of banks but strengthens the capital position for the banking industry in the sub-region. Despite these, few observed inconsistencies in the direction of influence, we find that overall, a significant number of the investment variables rather help in stabilizing the position of the banking industry from all the three perspectives of focus that the study explores.

7.2 Moderating impact of macroeconomic uncertainty

The results as depicted in Tables 5–7 are focused on examining the effect of the various strand of investment factors on the stability of the banking industry in a macroeconomic environment characterized by uncertainty; and where stability is proxied by bank liquid reserve, bank capital and bank Z-score, respectively. In Table 5, we observe from the results that MU has a significant negative influential role on the effect of all the various investment variables with the exception of GDS, where the direction of influence is positive and significant. This means that in times of uncertainty in the macroeconomic environment among economies in SSA, the inflow of FDI, GC, GI, bank credit to deposit, DCP, credit by all financial institutions and GCF do not benefit the banking industry in terms of ensuring stability by increasing liquid reserves. In other words, MU may be inimical to liquidity reserves in the banking industry even under increasing levels of investment, both from foreign and domestic sources. According to Table 6, MU does not significantly affect the relationship between the various investment factors and CAR. This signifies that, in general, uncertainty in the macroeconomic environment does not significantly affect the status of banks in terms of the quantum of capital in the industry. Similarly, in Table 7, where bank stability is proxied by the bank Z-score, the results show that MU has an insignificant moderating effect on the impact of all the investment variables on bank stability. Again, the implication here is that MU may not directly moderate how investment dynamics influence overall bank risk among economies in SSA.

In summary, it could be argued that, in general, uncertainty in the macroeconomic environment does not benefit the banking industry in terms of strengthening the liquid reserve position irrespective of the level of investment. For bank stability in terms of capital position and overall risk, however, uncertainty in the macroeconomic environment may be irrelevant in evaluating how the quantum of investment from domestic, foreign and government sources affect the industry.

Table 5.
Effect of investment factors on bank liquid reserve in an uncertain macroeconomic environment

Variables	(1) BLR	(2) BLR	(3) BLR	(4) BLR	(5) BLR	(6) BLR	(7) BLR	(8) BLR
1st Lag	0.797*** (22.29)	0.809*** (20.80)	0.808*** (20.85)	0.807*** (21.04)	0.808*** (20.81)	0.845*** (16.73)	0.809*** (20.72)	0.832*** (26.78)
FDI	0.0171 (0.85)	0.0150 (0.74)	0.0168 (0.84)	0.0163 (0.80)	0.0176 (0.87)	−0.0146 (−0.84)	0.0150 (0.74)	0.00470 (0.24)
GC	0.00382** (2.05)	0.00379** (2.09)	0.00376** (2.05)	0.00382** (2.14)	0.00376* (2.02)	0.00442** (2.69)	0.00383** (2.06)	0.00310 (1.64)
GI	−0.000710 (−0.48)	−0.00114 (−0.78)	−0.00104 (−0.72)	−0.00121 (−0.84)	−0.00116 (−0.79)	0.000260 (0.22)	−0.00114 (−0.78)	−0.000670 (−0.51)
BCD	−0.0485*** (−3.80)	−0.0499*** (−4.10)	−0.0500*** (−4.11)	−0.0472*** (−3.81)	−0.0498*** (−4.06)	−0.0223 (−1.39)	−0.0501*** (−4.11)	−0.0454*** (−3.40)
DCP	−0.229** (−2.63)	−0.212** (−2.50)	−0.218** (−2.43)	−0.229** (−2.65)	−0.213** (−2.49)	−0.196*** (−2.91)	−0.203** (−2.52)	−0.209** (−2.17)
PC	0.246*** (2.76)	0.230** (2.64)	0.237** (2.56)	0.247*** (2.78)	0.232** (2.64)	0.205*** (3.07)	0.221** (2.67)	0.226** (2.27)
GCF	0.211*** (3.57)	0.199*** (3.05)	0.201*** (3.18)	0.205*** (3.13)	0.203*** (3.39)	0.188*** (2.87)	0.202*** (3.08)	0.197*** (3.36)
GDS	0.0597** (2.68)	0.0579** (2.51)	0.0574** (2.51)	0.0590** (2.59)	0.0566** (2.52)	0.0205 (0.73)	0.0582** (2.50)	0.0479** (2.55)
LnFX	−0.00377** (−2.37)	−0.00302* (−1.74)	−0.00317* (−1.85)	−0.00313* (−1.81)	−0.00321* (−1.90)	−0.00259 (−1.46)	−0.00304* (−1.77)	−0.00244 (−1.66)
Trade	−0.0286*** (−3.74)	−0.0275*** (−3.43)	−0.0278*** (−3.54)	−0.0274*** (−3.49)	−0.0288*** (−3.70)	−0.0265* (−2.02)	−0.0276*** (−3.44)	−0.0252*** (−4.42)
GDPG	−0.228* (−2.00)	−0.187* (−1.72)	−0.201* (−1.80)	−0.194* (−1.88)	−0.211* (−1.88)	−0.303** (−2.17)	−0.194 (−1.69)	−0.244 (−1.67)
MS	0.0458 (0.61)	0.0197 (0.31)	0.0276 (0.44)	0.0191 (0.30)	0.0328 (0.54)	−0.142 (−1.13)	0.0247 (0.39)	0.0142 (0.16)
GQI	−0.0263*** (−6.40)	−0.0243*** (−5.17)	−0.0244*** (−5.23)	−0.0248*** (−5.35)	−0.0238*** (−5.13)	−0.0137 (−1.43)	−0.0242*** (−5.04)	−0.0199*** (−3.96)
MU*FDI	−0.427*** (−2.80)							
MU*GC		−0.0339** (−2.69)						
MU*GI			−0.0361** (−2.60)					
MU*BCD				−0.456*** (−2.81)				
MU*DCP					−2.115** (−2.69)			
MU*PC						−0.0294*** (−3.17)		
MU*GCF							−1.292** (−2.72)	
MU*GDS								0.607** (2.33)
Constant	0.0218 (0.98)	0.0252 (1.29)	0.0247 (1.29)	0.0231 (1.18)	0.0255 (1.32)	0.0311 (1.23)	0.0242 (1.23)	0.0254 (1.32)
Obs.	400	400	400	400	400	400	400	400
Countries	34	34	34	34	34	34	34	34
F-stat	9,863.6	9,557.3	10,900.1	10,799.6	7,423.1	12,464.4	7,047.7	18,611.7
P-value	8.99e-56	1.51e-55	1.73e-56	2.02e-56	9.78e-54	1.89e-57	2.30e-53	2.54e-60
Instruments	50	50	50	50	50	55	50	50
AR(1)	0.00678	0.00801	0.00755	0.00816	0.00711	0.0127	0.00769	0.00724
AR(2)	0.424	0.513	0.481	0.515	0.457	0.416	0.492	0.466
Hansen P	0.893	0.904	0.901	0.899	0.905	0.998	0.909	0.929

Notes: *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$. *t*-statistics in parentheses. BLR = Bank Liquid Reserve to Asset Ratio, CAR = Bank Capital to Asset Ratio, Z-Score = Bank Z Score, NPL = Non-Performing Loans, FDI = Foreign Direct Investment, GC = Government Consumption, GI = Government Investment, BCD = Bank Credit to Deposit Ratio, DCP = Domestic Credit to Private Sector, PC = Private Credit by Banks and Other Financial Institutions, GCF = Gross Capital Formation, GDS = Gross Domestic Savings, LnFX = Natural Log of Exchange Rate, Trade = Trade Openness, GDPG = GDP Growth, MS = Money Supply, GQI = Governance Quality Index, MU = Macroeconomic Uncertainty

Table 6. Impact of investment factors on bank capital in an uncertain macroeconomic environment

Variables	(1) CAR	(2) CAR	(3) CAR	(4) CAR	(5) CAR	(6) CAR	(7) CAR	(8) CAR
1st Lag	1.008*** (16.51)	0.908* (1.84)	0.920*** (16.45)	1.137*** (3.74)	0.973*** (18.52)	0.992*** (14.31)	0.988*** (17.57)	0.977*** (21.40)
FDI	0.0149 (1.52)	−0.0301 (−0.84)	0.00655* (1.81)	−0.0592** (−2.34)	0.0139* (1.81)	0.000883 (0.09)	0.0109 (1.40)	0.00712 (1.35)
GC	0.000291 (0.36)	0.00175 (0.15)	−0.000315 (−0.56)	0.00529 (0.71)	0.000546 (0.99)	−0.000740 (−0.66)	0.000267 (0.34)	−0.000755 (−1.15)
GI	−0.000284 (−0.93)	0.00371 (0.80)	−0.000114 (−0.51)	0.00634** (2.19)	−0.000257 (−0.98)	0.000722 (1.33)	−0.000275 (−0.90)	−0.000221 (−0.70)
BCD	0.0228** (2.15)	−0.0624 (−0.40)	0.00863* (1.82)	0.108 (0.83)	0.0266** (2.17)	−0.00346 (−0.26)	0.0201* (2.01)	0.0105* (1.86)
DCP	−0.0240* (−1.72)	0.0122 (0.23)	−0.00377 (−0.46)	−0.0382 (−0.47)	−0.0255** (−2.11)	−0.0132 (−0.80)	−0.0200 (−1.55)	−0.0121 (−1.31)
PC	0.00929 (0.74)	0.0255 (0.09)	−0.00212 (−0.24)	0.00459 (0.03)	0.00748 (0.68)	0.0133 (0.72)	0.00613 (0.49)	0.00680 (0.65)
GCF	0.00546 (0.59)	−0.0587 (−0.37)	−0.00216 (−0.24)	−0.217 (−1.48)	0.00674 (0.90)	0.00343 (0.42)	0.00420 (0.47)	0.0112 (0.96)
GDS	−0.00255 (−0.27)	0.138 (0.62)	−0.0135*** (−4.98)	0.132 (1.50)	0.00522 (0.54)	−0.00138 (−0.13)	−0.00250 (−0.27)	−0.0146** (−2.19)
LnFX	0.00144*** (2.94)	0.00883 (0.32)	0.000846** (2.70)	−0.00608 (−0.80)	0.00176*** (3.36)	0.000384 (0.85)	0.00159*** (3.13)	0.000591 (1.67)
Trade	0.0104 (1.47)	0.0222 (0.14)	0.00106 (0.31)	0.0693 (0.80)	0.0169** (2.14)	0.00247 (0.38)	0.0106 (1.48)	−0.00179 (−0.43)
GDPG	−0.0476 (−0.80)	0.0332 (0.35)	−0.00886 (−0.19)	0.142*** (2.83)	−0.0836* (−1.87)	−0.0609 (−1.36)	−0.0588 (−1.04)	0.0196 (0.32)
MS	0.0431 (1.10)	−0.0891 (−0.78)	−0.00714 (−0.23)	−0.117* (−2.04)	0.0810* (1.79)	0.00971 (0.30)	0.0388 (0.97)	−0.0195 (−0.64)
GQI	0.00204 (1.03)	0.0135 (0.29)	0.00157 (0.80)	0.0347 (0.99)	0.000646 (0.28)	−0.000989 (−0.41)	0.00197 (0.88)	0.00160 (0.92)
MU*FDI	−1.835 (−0.95)							
MU*GC		−1.033 (−0.86)						
MU*GI			0.105 (1.47)					
MU*BCD				−5.982 (−0.85)				
MU*DCP					−1.985 (−0.39)			
MU*PC						0.639 (0.13)		
MU*GCF							−1.159 (−0.46)	
MU*GDS								1.309 (0.36)
Constant	−0.0344 (−1.49)	−0.00860 (−0.03)	0.00380 (0.32)	−0.102 (−0.74)	−0.0456* (−1.72)	0.00169 (0.08)	−0.0290 (−1.27)	0.000365 (0.03)
Obs.	198	198	198	198	198	198	198	198
Countries	24	24	24	24	24	24	24	24
F-stat	202.8	180.2	1,794.5	14,009.1	425.2	984.2	150.8	6,103.1
P-value	8.78e-21	3.36e-20	1.28e-31	7.05e-42	1.89e-24	1.26e-28	2.54e-19	9.93e-38
Instruments	41	21	41	23	41	41	41	41
AR(1)	0.0208	0.239	0.0259	0.0523	0.0146	0.0275	0.0242	0.0217
AR(2)	0.338	0.681	0.254	0.527	0.406	0.270	0.327	0.265
Hansen P	0.999	0.998	0.966	0.893	0.999	0.997	0.997	0.997

Notes: *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$. *t* statistics in parentheses. BLR = Bank Liquid Reserve to Asset Ratio, CAR = Bank Capital to Asset Ratio, Z-Score = Bank Z Score, NPL = Non-Performing Loans, FDI = Foreign Direct Investment, GC = Government Consumption, GI = Government Investment, BCD = Bank Credit to Deposit Ratio, DCP = Domestic Credit to Private Sector, PC = Private Credit by Banks and Other Financial Institutions, GCF = Gross Capital Formation, GDS = Gross Domestic Savings, LnFX = Natural Log of Exchange Rate, Trade = Trade Openness, GDPG = GDP Growth, MS = Money Supply, GQI = Governance Quality Index, MU = Macroeconomic Uncertainty

Table 7.
Impact of investment factors on bank overall risk in an uncertain macroeconomic environment

Variables	(1) Z-Score	(2) Z-Score	(3) Z-Score	(4) Z-Score	(5) Z-Score	(6) Z-Score	(7) Z-Score	(8) Z-Score
1st Lag	0.911*** (35.38)	0.911*** (46.39)	0.904*** (35.33)	0.904*** (37.11)	0.898*** (34.69)	0.882*** (41.67)	0.904*** (37.12)	0.903*** (37.14)
FDI	1.469*** (2.88)	1.567*** (2.83)	1.750*** (3.40)	1.412*** (2.98)	1.972*** (4.02)	1.839*** (3.92)	1.408*** (2.97)	1.410*** (2.96)
GC	0.0195 (0.17)	−0.0434 (−0.43)	−0.0754 (−0.50)	−0.0374 (−0.32)	−0.103 (−0.75)	−0.0728 (−0.67)	−0.0410 (−0.35)	−0.0567 (−0.47)
GI	−0.0521 (−0.80)	0.0545 (1.28)	0.0848 (0.98)	0.0783 (1.12)	0.0848 (0.88)	0.0422 (0.91)	0.0814 (1.18)	0.0924 (1.35)
BCD	−0.176 (−0.25)	−1.164 (−1.33)	−0.149 (−0.20)	−1.093 (−1.18)	−0.230 (−0.29)	−0.404 (−0.58)	−1.072 (−1.16)	−0.949 (−1.06)
DCP	2.328** (2.58)	1.163 (1.23)	0.608 (0.64)	1.229 (1.27)	1.407* (1.70)	1.241* (1.73)	1.250 (1.29)	1.343 (1.35)
PC	−2.164 (−1.24)	1.401 (0.68)	0.897 (0.40)	1.505 (0.74)	−0.800 (−0.47)	−0.213 (−0.15)	1.399 (0.69)	0.963 (0.48)
GCF	−4.493** (−2.56)	−3.877** (−2.22)	−3.889* (−1.76)	−3.740* (−1.95)	−4.188** (−2.26)	−3.566 (−1.67)	−3.752* (−1.96)	−3.809* (−1.97)
GDS	2.481** (2.66)	1.629* (1.89)	0.689 (0.67)	1.564 (1.20)	0.936 (0.74)	1.323 (1.44)	1.535 (1.18)	1.410 (1.10)
LnFX	0.191*** (2.97)	0.0694 (0.86)	0.104 (1.31)	0.0676 (0.89)	0.144* (1.90)	0.0987* (1.83)	0.0715 (0.95)	0.0860 (1.18)
Trade	1.885** (2.20)	0.909 (1.41)	0.909 (1.36)	0.857 (1.31)	0.652 (1.10)	0.649 (0.94)	0.860 (1.31)	0.867 (1.33)
GDPG	1.897 (0.49)	4.234 (1.07)	6.359* (1.89)	4.287 (1.27)	4.987 (1.47)	3.926 (1.12)	4.276 (1.27)	4.111 (1.22)
MS	0.354 (0.28)	−1.801 (−1.67)	0.563 (0.47)	0.0636 (0.05)	1.246 (1.01)	1.792* (1.81)	0.0481 (0.04)	−0.00731 (−0.01)
GQI	0.828 (1.48)	−0.478 (−1.25)	−0.382 (−0.84)	−0.493 (−1.23)	0.0510 (0.14)	−0.106 (−0.33)	−0.470 (−1.18)	−0.387 (−1.00)
MU*FDI	3.262 (1.11)							
MU*GC		−0.254 (−0.75)						
MU*GI			−0.215 (−0.64)					
MU*BCD				−3.532 (−0.98)				
MU*DCP					4.776 (0.32)			
MU*PC						0.00338 (0.02)		
MU*GCF							−10.58 (−0.93)	
MU*GDS								3.724 (0.72)
Constant	−0.596 (−0.43)	0.218 (0.16)	−0.660 (−0.56)	−0.179 (−0.15)	−0.0335 (−0.03)	0.243 (0.18)	−0.169 (−0.14)	−0.140 (−0.11)
Obs.	420	420	420	420	420	420	420	420
Countries	36	36	36	36	36	36	36	36
F-stat	15,011.3	33,669.9	20,787.8	64,794.9	32,386.9	3,765.9	65,139.2	65,158.1
P-value	4.96e-62	3.61e-68	1.67e-64	3.82e-73	7.12e-68	1.59e-51	3.48e-73	3.46e-73
Instruments	56	53	55	54	56	57	54	54
AR(1)	0.0304	0.0253	0.0274	0.0264	0.0243	0.0268	0.0266	0.0269
AR(2)	0.438	0.455	0.463	0.454	0.456	0.462	0.454	0.453
Hansen P	0.997	0.990	0.988	0.993	0.985	0.983	0.993	0.992

Notes: *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$. *t* statistics in parentheses. BLR = Bank Liquid Reserve to Asset Ratio, CAR = Bank Capital to Asset Ratio, Z-Score = Bank Z Score, NPL = Non-Performing Loans, FDI = Foreign Direct Investment, GC = Government Consumption, GI = Government Investment, BCD = Bank Credit to Deposit Ratio, DCP = Domestic Credit to Private Sector, PC = Private Credit by Banks and Other Financial Institutions, GCF = Gross Capital Formation, GDS = Gross Domestic Savings, LnFX = Natural Log of Exchange Rate, Trade = Trade Openness, GDPG = GDP Growth, MS = Money Supply, GQI = Governance Quality Index, MU = Macroeconomic Uncertainty

7.3 Moderating impact of regulatory quality

Tables 8–10 are also presented to evaluate the moderating effect of governance quality in the relationship between various investment factors and stability of the banking industry using bank liquid reserve, CAR and bank Z-score, respectively. Results as shown in Table 8 indicate that governance quality has a negative moderating effect on the nexus between the various investment variables and bank liquid reserve with the exception of DCP and private credit by all financial institutions (both with insignificant magnitude of influence). these observed results imply that quality of governance does not benefit the banking industry by ensuring improvement in liquid reserves under increasing levels of FDI, domestic investment and GI. The focus of governance and the relative weak structure of institutions in the Sub-region could be cited as the main reason behind this observation. In Table 9, the results show that governance quality does not significantly influence the effect of the various investment variables on CAR; implying that improved governance quality does not strengthen the Capital position of the banking industry via the increased level of investment over the time period examined in this study. In Column (1) of Table 10, however, the results depict that governance quality has a positive influential role on the effect of inflow of FDI on bank Z-score (overall risk). this means that as governance improves in the Sub-region, increased levels of inflow of foreign investments enhances stability in the form of reduced level of overall risk. Again, in Column (5) of Table 10, it is evident that governance quality has a negative influential role in the relationship between DCP and bank Z-score. This suggests that increased rate of DCP does not stabilize the banking industry by reducing the overall risk or increasing profitability even under an improved governance environment in the Sub-region of SSA. We also observe that governance quality does not significantly influence the effect of the other investment variables on the overall risk of the banking industry.

The aforementioned results and discussions suggest that increased levels of investment may not necessarily benefit the banking industry in terms of improved liquid reserves even when the economies are characterized by improved governance structures. Again, governance quality is observed to be mostly immaterial in efforts at boosting the capital levels of banks in the sub-region via increased levels of investment over the period examined. The study also reveals that the inflow of FDI strengthens the banking industry by reducing overall risk under improved governance conditions. However, domestic credit to the private sector does not strengthen the banking industry via reduction in overall risk under improved quality of governance.

8. Postestimation and robustness checks

Reliability and acceptability of the various variables have been confirmed in the earlier section on data analysis. We proceed to subject the estimations in the various columns of Tables 4–10 to suitability and robustness checks by analyzing the post estimation results as displayed in the tables. For the GMM estimation suitability requirement, the number of instruments should be less than the number of observations; it is evident from all the estimations that this condition has been met. To also verify the overall fitness of the estimations, we make reference to the F-stats and their corresponding p-values. At the 5% alpha level, we can conclude that all the estimations are fit (p-values < 0.05 for all the estimations). The p-values of the Hansen test which verifies the validity of the instruments used for each of the estimations have also been presented. The null hypothesis for the Hansen test states that the instruments are valid as against the alternative that the instruments are not valid. From the tables, at 5% alpha level, we fail to reject the null hypothesis for all the estimations (p-values > 0.05) and conclude that the instruments used

Table 8.
Moderating role of governance quality-impact of investment factors on bank liquid reserve

Variables	(1) BLR	(2) BLR	(3) BLR	(4) BLR	(5) BLR	(6) BLR	(7) BLR	(8) BLR
1st Lag	0.840*** (28.40)	0.875*** (17.66)	0.803*** (25.13)	0.865*** (19.49)	0.831*** (24.13)	0.832*** (24.04)	0.780*** (17.68)	0.829*** (19.23)
FDI	−0.0355* (−1.87)	−0.00242 (−0.12)	0.000101 (0.01)	−0.00376 (−0.20)	−0.00469 (−0.31)	−0.00483 (−0.32)	−0.00579 (−0.31)	0.000324 (0.02)
GC	0.00509** (2.66)	0.00198 (1.13)	0.00567*** (2.81)	0.00296** (2.12)	0.00426* (1.90)	0.00426* (1.91)	0.00330 (1.56)	0.00120 (0.89)
GI	−0.00115 (−1.08)	−0.000231 (−0.20)	−0.00229 (−1.62)	−0.000673 (−0.63)	0.000147 (0.18)	0.000162 (0.20)	0.000691 (0.57)	−0.000101 (−0.11)
BCD	−0.0319** (−2.69)	−0.0293** (−2.34)	−0.0345** (−2.57)	−0.0522*** (−3.48)	−0.0300** (−2.10)	−0.0301** (−2.10)	−0.0345** (−2.24)	−0.0308* (−2.02)
DCP	−0.168* (−2.00)	−0.147 (−1.64)	−0.167* (−1.95)	−0.140* (−1.83)	−0.182** (−2.72)	−0.173** (−2.45)	−0.305*** (−4.48)	−0.306*** (−4.14)
PC	0.189** (2.16)	0.155 (1.68)	0.173* (1.97)	0.160* (1.99)	0.184** (2.67)	0.176** (2.61)	0.312*** (4.37)	0.330*** (4.28)
GCF	0.203*** (3.16)	0.151** (2.09)	0.201** (2.70)	0.150* (1.92)	0.192*** (3.06)	0.192*** (3.06)	0.222*** (3.06)	0.254*** (4.23)
GDS	0.0375 (1.69)	0.0477** (2.11)	0.0437 (1.54)	0.0487** (2.33)	0.0431 (1.43)	0.0427 (1.42)	0.0399 (1.34)	−0.0589 (−1.66)
LnFX	−0.00251 (−1.51)	−0.00125 (−0.74)	−0.00351** (−2.30)	−0.00208 (−1.25)	−0.00166 (−1.38)	−0.00165 (−1.38)	−0.00337* (−1.88)	−0.00251* (−1.88)
Trade	−0.0221** (−2.26)	−0.0167 (−1.69)	−0.0251** (−2.71)	−0.0231** (−2.21)	−0.0188 (−1.46)	−0.0189 (−1.48)	−0.0358*** (−3.71)	−0.0404*** (−3.27)
GDPG	−0.228* (−1.97)	−0.106 (−0.95)	−0.301** (−2.18)	−0.118 (−0.97)	−0.154 (−0.86)	−0.154 (−0.86)	−0.402** (−2.44)	−0.315*** (−2.93)
MS	0.0921 (1.14)	0.0548 (0.82)	0.0653 (1.14)	−0.00588 (−0.05)	−0.0482 (−0.68)	−0.0481 (−0.68)	0.0821 (1.30)	0.0250 (0.33)
MU	−0.218** (−2.24)	−0.181* (−1.77)	−0.197* (−2.01)	−0.186** (−2.09)	−0.211*** (−2.74)	−0.212** (−2.73)	−0.349*** (−4.27)	−0.371*** (−4.24)
GQI*FDI	−0.0640*** (−3.42)							
GQI*GC		−0.00156* (−1.94)						
GQI*GI			−0.00285*** (−3.71)					
GQI*BCD				−0.0179** (−2.06)				
GQI*DCP					−0.00977 (−0.40)			
GQI*PC						−0.0114 (−0.44)		
GQI*GCF							−0.0852*** (−3.65)	
GQI*GDS								−0.144*** (−4.24)
Constant	0.00156 (0.08)	0.00429 (0.20)	0.0187 (0.78)	0.0344 (1.23)	0.0147 (0.51)	0.0144 (0.50)	0.0299 (1.21)	0.0401** (2.14)
Obs.	400	400	400	400	400	400	400	400
Countries	34	34	34	34	34	34	34	34
F-stat	1,800.2	29,324.2	5,014.7	3,390.7	4,649.3	4,668.4	15,080.9	6,491.1
P-value	1.36e-43	1.41e-63	6.30e-51	3.99e-48	2.19e-50	2.05e-50	8.17e-59	8.94e-53
Instruments	54	53	54	53	53	53	53	50
AR(1)	0.00461	0.00743	0.00397	0.00926	0.0110	0.0110	0.00693	0.00867
AR(2)	0.512	0.533	0.437	0.605	0.552	0.552	0.264	0.466
Hansen P	0.997	0.996	0.995	0.989	0.996	0.996	0.957	0.883

Notes: *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$. *t*-statistics in parentheses. BLR = Bank Liquid Reserve to Asset Ratio, CAR = Bank Capital to Asset Ratio, Z-Score = Bank Z Score, NPL = Non-Performing Loans, FDI = Foreign Direct Investment, GC = Government Consumption, GI = Government Investment, BCD = Bank Credit to Deposit Ratio, DCP = Domestic Credit to Private Sector, PC = Private Credit by Banks and Other Financial Institutions, GCF = Gross Capital Formation, GDS = Gross Domestic Savings, LnFX = Natural Log of Exchange Rate, Trade = Trade Openness, GDPG = GDP Growth, MS = Money Supply, GQI = Governance Quality Index, MU = Macroeconomic Uncertainty

Table 9. Moderating role of governance quality-impact of investment factors on bank Capital

Variables	(1) CAR	(2) CAR	(3) CAR	(4) CAR	(5) CAR	(6) CAR	(7) CAR	(8) CAR
1st Lag	0.849*** (13.32)	0.983*** (17.69)	0.975*** (18.00)	0.984*** (17.60)	0.557*** (3.00)	0.483** (2.32)	0.867*** (13.57)	0.530** (2.30)
FDI	0.00479 (0.76)	0.0142* (1.85)	0.0133 (1.71)	0.0143 (1.68)	0.00841 (0.23)	0.00413 (0.11)	0.00396 (0.29)	0.0473 (1.50)
GC	−0.000197 (−0.60)	0.000643 (0.84)	0.000618 (0.81)	0.000640 (0.82)	−0.0109 (−1.21)	−0.00935 (−1.10)	0.000274 (0.32)	−0.0203** (−2.35)
GI	0.000274 (0.88)	−0.000376 (−1.15)	−0.000309 (−0.72)	−0.000377 (−1.14)	−0.000529 (−0.17)	−0.0000277 (−0.01)	0.000258 (0.61)	−0.00481 (−0.91)
BCD	0.00369 (0.43)	0.0265** (2.55)	0.0250** (2.27)	0.0268** (2.35)	0.0379 (0.42)	−0.0113 (−0.13)	0.00367 (0.28)	−0.100 (−0.64)
DCP	0.00585 (0.42)	−0.0280* (−2.06)	−0.0256* (−1.75)	−0.0283* (−1.79)	0.0272 (0.29)	0.0198 (0.69)	0.00380 (0.18)	−0.0212 (−0.31)
PC	−0.0128 (−0.88)	0.0119 (0.93)	0.00954 (0.69)	0.0120 (0.77)	−0.113 (−0.67)	−0.0479 (−0.29)	−0.00829 (−0.46)	−0.163 (−0.93)
GCF	−0.0103 (−1.15)	0.00764 (0.74)	0.00737 (0.72)	0.00789 (0.76)	−0.0867 (−0.72)	−0.0343 (−0.26)	−0.00397 (−0.32)	−0.206 (−1.15)
GDS	−0.0149* (−2.02)	0.00541 (0.58)	0.00437 (0.43)	0.00549 (0.50)	−0.172 (−1.49)	−0.169 (−1.35)	−0.0165 (−1.11)	−0.0388 (−0.22)
LnFX	0.000757* (1.81)	0.00173*** (2.92)	0.00172*** (3.11)	0.00174*** (3.16)	0.0204* (1.77)	0.0204 (1.67)	0.000664 (1.59)	0.00265 (0.12)
Trade	0.0000426 (0.01)	0.0172** (2.20)	0.0161* (1.97)	0.0173* (1.84)	0.0449 (0.66)	0.00452 (0.06)	−0.0000300 (−0.00)	0.105 (1.24)
GDPG	−0.0150 (−0.28)	−0.0776 (−1.27)	−0.0790 (−1.28)	−0.0791 (−1.36)	0.0591 (0.49)	0.110 (0.80)	−0.0239 (−0.41)	−0.0793 (−0.35)
MS	−0.0149 (−0.30)	0.0784 (1.47)	0.0739 (1.40)	0.0806 (1.60)	−0.0203 (−1.16)	−0.00695 (−0.27)	0.0116 (0.24)	−0.0272 (−1.46)
MU	0.462 (0.93)	−0.318 (−0.52)	−0.264 (−0.42)	−0.340 (−0.55)	1.393 (0.59)	1.493 (0.62)	0.593 (0.78)	1.019 (0.30)
GQI*FDI	0.00398 (0.57)							
GQI*GC		0.0000166 (0.04)						
GQI*GI			0.0000668 (0.20)					
GQI*BCD				0.000123 (0.03)				
GQI*DCP					−0.00485 (−0.05)			
GQR*PC						−0.0373 (−0.41)		
GQR*GCF							0.00141 (0.14)	
GQR*GDS								0.343 (1.12)
Constant	0.0178 (0.85)	−0.0477* (−1.84)	−0.0440 (−1.68)	−0.0484 (−1.66)	0.0418 (0.44)	0.0761 (1.11)	0.00830 (0.35)	0.338 (1.09)
Obs.	198	198	198	198	198	198	198	198
Countries	24	24	24	24	24	24	24	24
F-stat	618.3	142.4	146.4	150.7	1,286.9	608.4	548.7	700.4
P-value	2.60e-26	4.85e-19	3.55e-19	2.56e-19	5.81e-30	3.13e-26	1.02e-25	6.24e-27
Instruments	45	41	41	41	36	36	43	34
AR(1)	0.0278	0.0149	0.0148	0.0160	0.197	0.181	0.0311	0.278
AR(2)	0.238	0.412	0.396	0.418	0.202	0.288	0.262	0.340
Hansen P	0.997	0.999	0.999	0.999	0.997	0.999	0.995	0.907

Notes: *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$. *t*-statistics in parentheses. BLR = Bank Liquid Reserve to Asset Ratio, CAR = Bank Capital to Asset Ratio, Z-Score = Bank Z Score, NPL = Non-Performing Loans, FDI = Foreign Direct Investment, GC = Government Consumption, GI = Government Investment, BCD = Bank Credit to Deposit Ratio, DCP = Domestic Credit to Private Sector, PC = Private Credit by Banks and Other Financial Institutions, GCF = Gross Capital Formation, GDS = Gross Domestic Savings, LnFX = Natural Log of Exchange Rate, Trade = Trade Openness, GDPG = GDP Growth, MS = Money Supply, GQI = Governance Quality Index, MU = Macroeconomic Uncertainty

Table 10.
Moderating role of governance quality-impact of investment factors on overall bank risk

Variables	(1) Z-Score	(2) Z-Score	(3) Z-Score	(4) Z-Score	(5) Z-Score	(6) Z-Score	(7) Z-Score	(8) Z-Score
1st Lag	0.909*** (49.77)	0.894*** (45.52)	0.894*** (38.89)	0.896*** (37.90)	0.893*** (39.25)	0.897*** (38.73)	0.896*** (49.71)	0.898*** (47.41)
FDI	1.871*** (2.98)	1.770*** (4.09)	1.959*** (4.64)	1.927*** (3.92)	1.011** (2.04)	1.956*** (4.54)	1.921*** (3.41)	1.866*** (3.30)
GC	−0.0281 (−0.26)	0.110 (0.97)	0.0885 (0.75)	−0.0921 (−0.65)	0.0307 (0.23)	0.00364 (0.03)	−0.154 (−1.35)	−0.0769 (−0.61)
GI	−0.0422 (−0.74)	−0.0307 (−0.44)	−0.0206 (−0.32)	0.0903 (1.43)	0.0492 (0.83)	0.00922 (0.13)	0.0758 (0.81)	0.0118 (0.13)
BCD	−0.422 (−0.51)	0.269 (0.35)	0.368 (0.43)	−0.525 (−0.57)	−1.167 (−1.27)	0.404 (0.49)	0.0129 (0.02)	0.389 (0.64)
DCP	2.117** (2.35)	1.167* (1.90)	1.100* (1.70)	1.455* (1.72)	−0.139 (−0.10)	1.317* (1.93)	0.368 (0.51)	0.440 (0.61)
PC	−1.915 (−0.91)	−0.215 (−0.21)	0.0356 (0.03)	−0.202 (−0.10)	4.101 (1.45)	−1.619 (−0.74)	0.351 (0.21)	0.196 (0.11)
GCF	−5.161*** (−3.51)	−4.223** (−2.37)	−4.164** (−2.06)	−3.155* (−1.71)	−3.574* (−1.72)	−5.572** (−2.19)	−5.823*** (−3.05)	−4.751*** (−2.87)
GDS	2.545* (1.88)	2.167*** (3.06)	1.758** (2.30)	0.543 (0.46)	1.562 (1.65)	2.303** (2.51)	1.271* (1.82)	0.863 (1.07)
LnFX	0.117* (1.85)	0.158** (2.63)	0.150** (2.39)	0.127* (1.73)	0.0786 (1.33)	0.154** (2.56)	0.111 (1.67)	0.143** (2.33)
Trade	1.400** (2.22)	1.546* (1.89)	1.358* (1.87)	0.357 (0.42)	0.598 (0.79)	1.886* (2.02)	0.994 (1.60)	1.124* (1.84)
GDPG	2.576 (0.58)	1.428 (0.38)	1.921 (0.50)	6.642* (1.89)	6.200* (1.82)	2.317 (0.66)	3.687 (0.90)	4.289 (1.01)
MS	−2.164** (−2.06)	1.908* (2.01)	1.839* (1.82)	1.428 (1.32)	−0.110 (−0.09)	1.110 (0.91)	−0.796 (−0.80)	−0.464 (−0.45)
MU	2.287 (0.82)	0.00452 (0.00)	−0.333 (−0.25)	−0.116 (−0.05)	−5.130 (−1.66)	2.797 (0.80)	−0.715 (−0.30)	−0.610 (−0.24)
GQI*FDI	1.384* (1.89)							
GQI*GC		0.0578 (1.16)						
GQI*GI			0.0369 (0.68)					
GQI*BCD				−0.438 (−0.77)				
GQI*DCP					−2.208* (−1.79)			
GQI*PC						1.595 (1.10)		
GQI*GCF							−1.436 (−1.31)	
GQI*GDS								−0.423 (−0.45)
Constant	0.718 (0.55)	−1.697 (−1.46)	−1.705 (−1.21)	−0.190 (−0.12)	−0.166 (−0.10)	−1.216 (−0.89)	0.639 (0.48)	−0.145 (−0.11)
Obs.	420	420	420	420	420	420	420	420
Countries	36	36	36	36	36	36	36	36
F-stat	26,786.5	5,313.2	30,728.9	10,024.0	31,682.8	15,703.0	288,153.7	359,201.9
P-value	1.97e-66	3.86e-54	1.78e-67	5.81e-59	1.05e-67	2.26e-62	1.74e-84	3.68e-86
Instruments	53	57	57	56	54	57	53	53
AR(1)	0.0246	0.0306	0.0268	0.0252	0.0277	0.0260	0.0251	0.0259
AR(2)	0.486	0.439	0.438	0.461	0.476	0.445	0.457	0.455
Hansen P	0.996	0.995	0.991	0.977	0.985	0.995	0.951	0.937

Notes: *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$. *t*-statistics in parentheses. BLR = Bank Liquid Reserve to Asset Ratio, CAR = Bank Capital to Asset Ratio, Z-Score = Bank Z Score, NPL = Non-Performing Loans, FDI = Foreign Direct Investment, GC = Government Consumption, GI = Government Investment, BCD = Bank Credit to Deposit Ratio, DCP = Domestic Credit to Private Sector, PC = Private Credit by Banks and Other Financial Institutions, GCF = Gross Capital Formation, GDS = Gross Domestic Savings, LnFX = Natural Log of Exchange Rate, Trade = Trade Openness, GDPG = GDP Growth, MS = Money Supply, GQI = Governance Quality Index and MU = Macroeconomic Uncertainty

are valid; reliable inferences could, therefore, be made based on the results. We proceed to also confirm that there exist no serial correlation; that is, there should not be serial correlation in the error term. This assessment is carried out in reference to the p-values of the AR(2) test as shown in each of the columns of all the tables. At the 5% alpha level, we fail to reject the null hypothesis (p-values > 0.05), and therefore, aver that the error terms do not display serial correlations; the moment conditions can, hence, be said to be correctly specified. In effect these post estimation checks place greater confidence in the results, implying that interpretations made are, therefore, valid.

9. Summary, conclusion and policy implications

This empirical inquiry was designed to examine the effect of strand of investment factors on the stability of key measures of the banking industry, such as the liquid reserve, capital and overall risk. Additionally, we assessed how these investment variables affect the stability of the industry in an environment characterized by MU; and improved governance structures. Using data from 37 countries in SSA from 2000 to 2018 from various data sources, empirical estimations were performed using the two-step system GMM methodology as a result of its superiority in delivering valid results for inferences.

Reported empirical estimates, suggest that the direction and magnitude of impact of strand of investment factors on stability of the banking industry are dependent on the aspect of the banking industry being analyzed. GCF (domestic investment) improves the liquid reserve position of banks but does not benefit the industry in terms of reducing the overall risk. The study further finds that DCP weakens the liquid reserve status of banks in the sub-region but stabilizes the industry by way of reducing the overall risk of banks. We further conclude from the findings of the study that overall net inflow of FDI benefits the banking industry in the sub-region by improving its stability. Again, results of the study indicates that BCD strengthens the capital position of banks but deteriorates the liquid reserve stance of the industry in the sub-region. Our results also show that GC and private credit by all financial institutions generally help in stabilizing the banking industry in SSA. Overall, we find that despite adverse effects from some investment indicators, generally, an increased rate of investment/consumption, from either the government, foreign investors or private domestic investors boosts the stability of the industry in the sub-region.

The study also concludes that uncertainty in the macroeconomic environment does not benefit the banking industry in terms of strengthening the liquid reserve position irrespective of the quantum of investment. For strengthening of the capital position and reduction of overall risk via various forms of investment, however, MU plays insignificant role among economies in the sub-region of SSA. Again, we also find that improved governance structure does not benefit the banking industry in terms of increasing the liquid reserve position in an environment with increased rate of investment; that is, efforts at improving the liquid reserve position of the banking industry through good governance may not yield the desired results among banks in the sub-region. However, in terms of reducing the overall risk as a form of stabilizing the industry, the study concludes that increased rate of net inflow of FDI coupled with improved governance quality benefits the banking sector in the sub-region.

Various conclusions from this study can augment efforts by various stakeholders including players in the banking industry, regulators, policymakers, governments, private investors and academic researchers. For researchers, this paper presents conclusions that could form the basis for further research and serve as source literature. Banking sector players could rely on the findings from the study to inform their strategic plans in terms of guarding against stability problems by examining effect of trend dynamics associated with

varied investments. The study suggests that banks need to assess the quantum of credit facilities offered to the private sector in relation to the total deposits and capital to ensure the requisite support base exists for such loan advancements. For strengthening of the banking industry, a core mandate of regulators, the government and allied agencies, the conclusions provides a reliable policy direction aimed at ensuring a robust banking industry in the sub-region. For instance, analyzed results proffer, the need for the enactment and promulgation of policies that engender investment from the government, domestic investors and foreign investors to ensure overall stability of the banking industry in the sub-region. Again, as efforts are in place to boost investment, there is also the need to ensure that policymakers and governments in the sub-region pursue strategies that stabilize the macroeconomic environment to promote banking industry stability among other things. There is also the need for policymakers to improve the regulatory and governance environment in the sub-region. The results as discussed suggest that overall, regulatory and governance measures do not directly influence stability of the banking industry in the sub-region; which suggest that the industry has to be given the needed attention through targeted policies that could have the necessary impact on the stability of the banking industry.

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